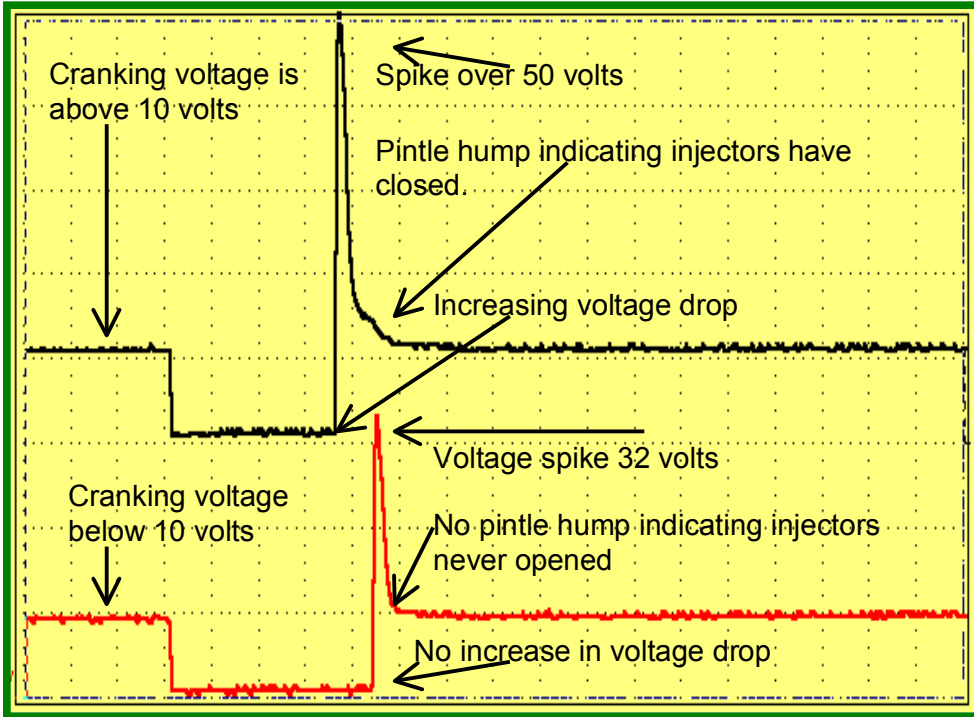


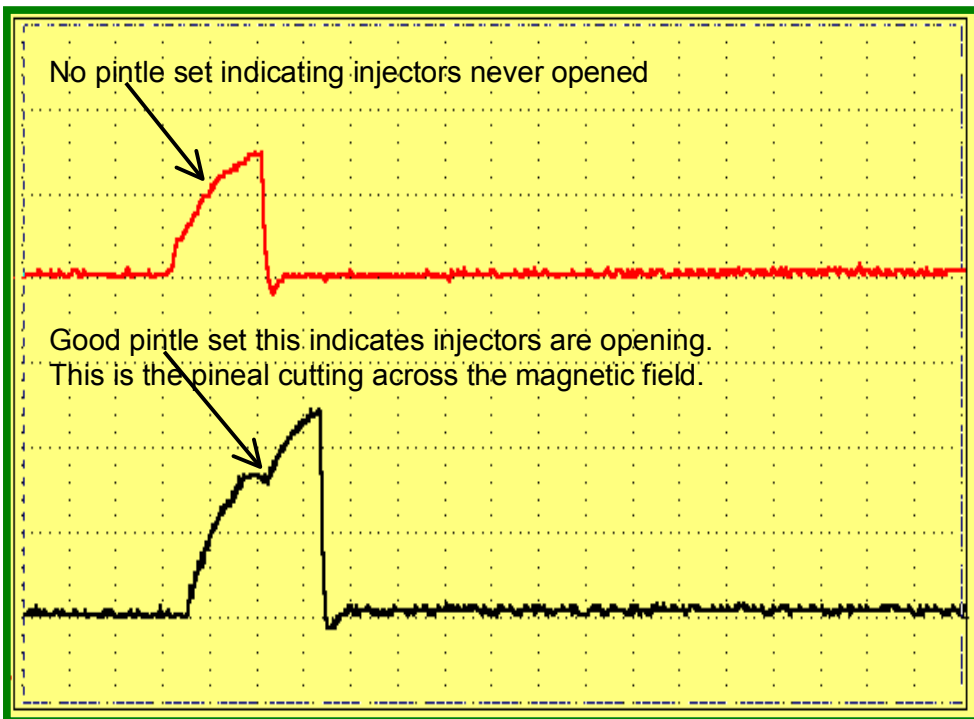
2.3L LH-JETRONIC On a 1989 Volvo 740 series (None-Turbo)

Crank no start Volvo has been a very intermittent problem. Finally got it to act up. After all the basics checked out good including battery, alternator, and starter, the weak injector pulse was found with a current clamp. The following Waveforms are single shot tests. Using 1:1 test lead for voltage and a current clamp for amperage.

1mSec/Div 10Volts/Div 1msSec/Div 10Volts/Div



Clamp Conversion = 100mv/1Amp



The black trace is showing a single shot test when engine was starting. Note the voltage spike is 50 volts due to the stronger magnetic field collapsing. The cranking voltage is above 10 volts and the voltage drop on the ground-side increases due to the current increase. This is a healthy circuit.

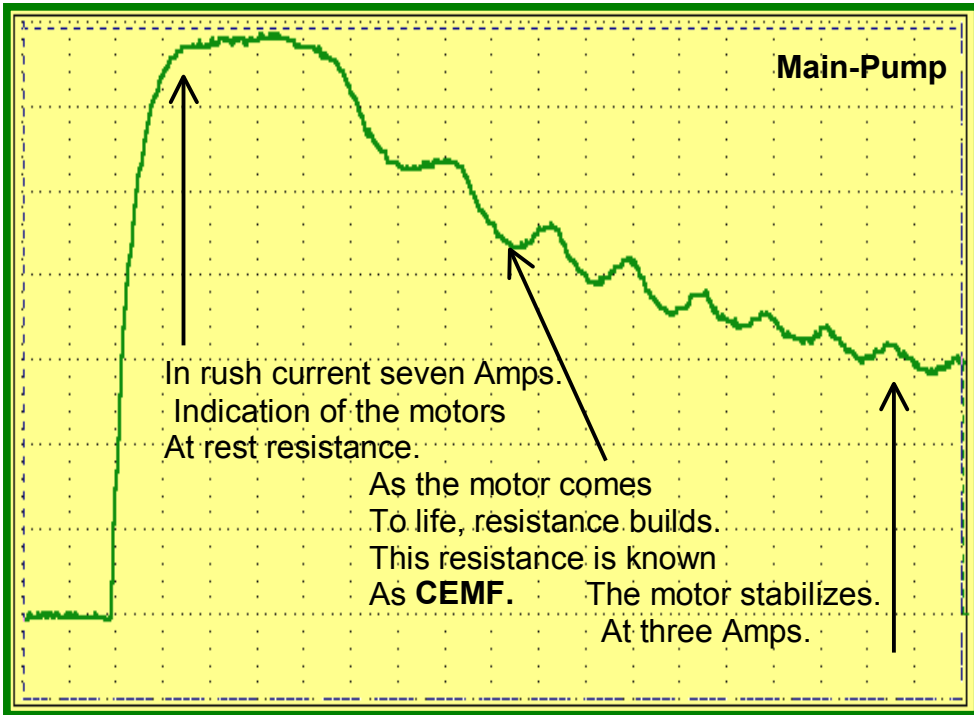
The red trace is showing the engine when it was not starting. Note the voltage spike is just above 30 volts due to the weaker magnetic field. The cranking voltage is under 10 volts and there is very little voltage drop increase on the ground side indicating less current build up. There is not enough current to open the injector caused by the voltage drop on the positive side of the circuit. Looking at the whole picture with one test is just one advantage using a scope has over a noid light. Keep in mind, the current required to flash a noid is considerably less.

Using a current clamp. Red trace when engine would not start. The maximum amperage is 1.4 and no pindle set.

The black trace when engine would start is showing maximum amperage at 2.4 and good pindle set.

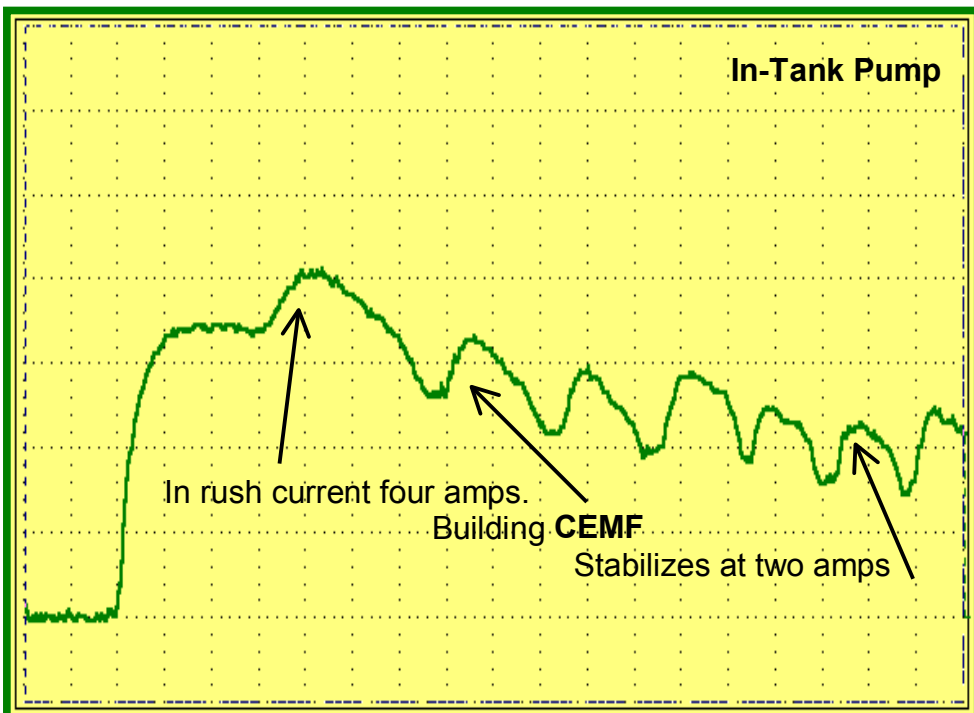
1989 Volvo 740 Series 2.3L (None Turbo) Single Shot Testing (Fuel Pumps)

Testing both in-tank and main-pumps with engine not starting. This test can uncover a lot more than just bad fuel pumps. Looking at the fuel pumps current Waveforms while cranking a no start can uncover: Bad Crank shaft sensors, Fuel system relays, Ignition system ECU, Fuel System ECU, Wiring problems powers and grounds, Restricted fuel filters, and bad pumps. For example: If the pumps don't kick in at all when cranking the engine anything electrical or electronic that has to do with running the pumps would be suspect. Using wiring diagrams is an essential part of this process. Below are the fuel pumps being tested in this manner



Clamp conversion = 100mv/1Amp

Testing the pump with the clamp around the negative wire engine not starting. This is a measurement of the main pumps branch current. The pumps on this Volvo are in a parallel arrangement. Looking at the main pumps trace is proving the pump is in good condition. The rest of the system should be in good condition as well.



The in-tank pump stabilizes at two amps. This is a much smaller pump and is supplying the main pump. This pumps trace is showing a good pump and circuit.